Chapter 9
Energy Recovery and Incineration

This chapter describes how incineration of municipal solid waste (MSW) for energy recovery will be considered in the Plan. Energy recovery from the incineration of special wastes is described in the *Special Wastes Chapter*.

Introduction

Energy recovery incineration (ER/I) facilities may use either mass burning systems or prepared fuel systems. Mass burning systems involve feeding mixed municipal solid waste (MMSW) into a furnace or boiler without mechanically separating or preparing the waste in any way. These facilities can be either large field-erected furnace-boiler systems or smaller modular furnace-boiler systems.

In prepared fuel systems, MMSW is mechanically separated and processed to make refuse-derived fuel (RDF), either as a supplemental fuel for an existing furnace-boiler or to be used alone in a dedicated furnace-boiler.

Energy recovery is rarely associated with small incinerators; incinerators burning less than 250 tons per day do not produce cost effective steam. Medium and large MSW incinerators, however, can install larger boilers, which will generate cost-effective steam. This steam can then be used to generate electricity, power industrial processes, or provide heat.

Definitions

Washington Administrative Code (WAC) 173-304 provides the following definitions for energy recovery through the incineration of MSW.

Energy recovery is defined as "the recovery of energy in a useable form from mass burning or refuse-derived fuel incineration, pyrolysis or any other means of using the heat of combustion of solid waste that involves high temperature (above twelve hundred degrees Fahrenheit) processing."

Incineration is defined as "reducing the volume of solid wastes by use of an enclosed device, using controlled-flame combustion."

Pyrolysis is defined as 'the process in which solid wastes are heated in an enclosed device in the absence of oxygen to vaporization, producing a hydrocarbon-rich gas capable of being burned for recovery of energy."

Refuse-derived fuel (RDF) - Burnable MSW that has been shredded or pelletized into a uniform size and shape before it is burned. Separation of burnable and non-burnable MSW is done at the facility where RDF is made.

Existing Conditions

Energy Recovery in Clark County

Currently, the County and cities do not have any operating or planned ER/I facilities. The 1985 Plan update included a detailed evaluation of the development and operations of an ER/I facility in Clark County. After significant public opposition, the 1985 plan recommended that ER/I not be considered as a viable disposal option. The 1994 plan recommended that regional ER/I activities be monitored and then reconsidered during the next plan update.

Some source-separated post-consumer materials, such as pallets, have traditionally been processed for use as "hog fuel." Hog fuel (so called because it has typically been processed through a type of grinder called a hammer hog) is a broad term that includes residue material from log sorting yards, lumber mills and stump grinding operations. It can also include post-consumer wood waste from source-separated collection services or recovered from solid waste processing. Hog fuel is burned to heat industrial boilers for process-steam generation. Markets for hog fuel have not distinguished between pre-consumer, post-consumer or industrial wastes.

Source-separated wood waste recovery has increased significantly since the 1994 Plan was developed. Much of this recovered material is currently sold as hog fuel while lesser quantities are periodically marketed to particleboard and liner board manufacturers. No source-separated wood waste is currently being landfilled. The wood-waste recovery market in Clark County is very competitive; in-county and regional operators from the Portland area actively compete for material. Despite this competition, hog-fuel market prices are still very volatile, ranging from $6 to $22 per bone dry ton. In Clark County, Columbia Resource Company (CRC) sorts wood waste from incoming MSW in addition to collecting source-separated materials from larger generators. Other private wood-waste recycling operators, such as H&H Wood Recyclers, Inc., also collect and process source-separated wood waste, land clearing debris and similar materials.

Wood waste burned as hog fuel and motor oil burned as bunker fuel (use of motor oil as an alternative fuel source is addressed in the Moderate Risk Waste Chapter) are not included in Clark County's recycling rate computations.

During the mid-1980s, state grants were available for counties and cities to study the use of ER/I facilities as an alternative to landfilling solid waste. In many cases these local governments were concerned about the risks and uncertainties of siting and permitting replacement landfills in their jurisdictions. Later in the decade, interest in ER/I was replaced by interest in exporting solid waste to large regional landfills in eastern Washington and Oregon. Waste exporting eliminates local concerns about landfill siting and often costs less than ER/I. ER/I technology and economics, however, continue to change and one-day ER/I facilities may be viable in the Pacific Northwest.

Throughout Washington State — Past And Present

The City of Tacoma operates the only RDF facility in Washington at its solid waste complex; the processed RDF from the facility is then burned at the City's power station and the residual ash landfilled.

There are currently two operating MMSW energy recovery incinerators in Washington State: an 800 ton-per-day (tpd) facility in Spokane and a 100 tpd facility in Ferndale (Whatcom County). The Spokane facility is owned by the City of Spokane, managed by the Spokane Regional Solid Waste System and operated by Wheelabrator Spokane, Inc. This facility opened in 1991 with partial funding through a State-matching grant. The Ferndale facility is owned and operated by Recomp of Washington (Recomp) under a disposal agreement with the City of Bellingham. Both facilities use energy recovery equipment to generate electricity, which is then used for in-plant operations or sold to utility companies.

Several other MSW incinerators within Washington State have closed recently. Incinerators in both Skagit and San Juan Counties have been permanently retired. The Skagit incinerator built in 1988 was also partially funded through a State-matching grant. The 178-tpd facility was closed in 1996 due to equipment failures and high operating costs. A smaller incinerator in Friday Harbor (San Juan County) was closed in 1995 because its environmental compliance costs exceeded its budget. Olivine Corporation's 100-tpd incinerator in Whatcom County was forced to suspend operations due to its inability to compete economically against other county waste export operations. The Spokane facility is an example of a field-erected mass burn system; the Recomp facility in Bellingham and the closed facilities in Skagit and San Juan Counties are examples of modular systems.

All incinerators in Washington State are subject to the "Special Incinerator Ash Standards" adopted by the Department of Ecology in 1991. These standards require ash be tested to determine whether it must be handled as a solid waste or as a "special waste." Currently, both MMSW incineration facilities operating in Washington transport their ash to a dedicated ash cell at Rabanco's Regional Disposal Company landfill in Roosevelt, Washington. This type of facility typically produces ash equivalent to 30% by weight and 10% by volume of the incoming waste.

Energy Recovery Nationwide, Local Experience

During the 1980s and early 1990s, many communities turned to ER/I facilities (both mass burning and RDF plants) as a way to extend the life of local landfills or minimize the size of replacement-ash landfills. Typically, communities used revenue bonds to finance capital costs; capital and operating costs were then funded through tipping fees. Because tipping fees at ER/I facilities were usually higher than neighboring landfills, communities adopted flow-control ordinances to ensure that the facilities received enough waste to remain economically viable.

The 1994 U.S. Supreme Court ***Carbone*** decision on flow control jeopardizes the ability of local governments to direct waste to ER/I facilities. The inability to control the flow of MSW, concerns over the disposal of hazardous ash and the emergence of lower-cost regional landfills have essentially stopped the construction of new ER/I facilities and severely hindered existing operations.

In the Portland area, Browning-Ferris Industries (BFI) and Rabanco, joint-venture partners operating the Metro Central Transfer Facility, installed processing equipment to convert mixed waste paper and some plastics into a fiber-based fuel (FBF) which was then sold primarily to hog fuel consumers. Strong recycling markets for the feedstocks in 1995 made it difficult to obtain enough materials to make enough FBF to support the process. In 1997, wood chip and natural gas prices fell, forcing FBF out of the market and eventually causing the project to be discontinued and the equipment sold.

Needs and Opportunities

The 1985 Plan concluded that an ER/I facility was not appropriate for Clark County in the short term. After 1985, ER/I alternatives were again considered but high investment and operating costs, facility siting and permitting uncertainties, air pollution and ash disposal concerns and other issues associated with ER/I technology continued to make out-of-county landfilling more suitable for the County and cities. Instead, the County implemented a 20-year disposal system with CRC, which transports MSW to Finley Buttes Landfill in Morrow County, Oregon. Since the County has a contractual commitment with CRC through 2011, disposal alternatives for MSW will not need to be considered until a few years prior to that date.

Thus far the use of wood waste as a fuel source for energy recovery has been market driven. Because of that, the County should consider whether economic or other incentives are needed or wanted to maintain diversion under poor market conditions. The County should also consider whether similar incentives are suitable to support fiber-based fuel as an alternative use for source-separated materials during market downturns.

Alternatives

The Solid Waste Advisory Commission reviewed the following Alternatives:

1. *Re-examine the development of an Energy Recovery/Incinerator facility for MSW as part of the 2004 Plan prior to the 2011 expiration date of the current waste export contract.*

2. *Consider alternatives to keep wood waste out of landfills during downturns in hogfuel markets.*

3. *Develop criteria for diverting paper and plastics to alternative markets during market downturns.*

4. *Monitor the volume of wood waste diverted from landfills to energy recovery.*

5. *Review the state priorities for the management of solid waste (70.95.010) and consider establishing energy recovery as a higher priority than incineration and landfilling within Clark County.*

Evaluation of Alternatives

1. *Re-examine the development of an Energy Recovery/Incinerator facility for MSW as part of the 2004 Plan prior to the 2011 expiration date of the current waste export contract.*

ER/I alternatives were considered in 1985 and in subsequent years. High investment and operating costs, facility siting and permitting uncertainties, air pollution and ash, as well as lack of flow control and a twenty year export disposal contract has continued to make an this ER/I facility option unsuitable for Clark County and the cities.

2. *Consider alternatives to keep wood waste out of landfills during downturns in hog-fuel markets.*

Wood is one of the largest components in the building industry's waste stream and the majority of it is currently being used for fuel. Markets for wood as a fuel are driven by other fuel supplies, such as natural gas. If prices for those fuels fall, the stability of diversion in the building industry could be undermined.

Education efforts will be integrated with efforts to encourage strong markets for recyclables. Other key elements include: supporting salvage practices and markets for reused building materials, and, supporting development of industries using recycled construction and demolition materials.

3. *Develop criteria for diverting paper and plastics to alternative markets during market downturns.*

Many grades of paper and types of plastic have recycling markets. Due to over-supply or lack of demand, source-separated or post-collection recovered materials are left without a market. In these circumstances, lower grades of materials are most often without a buyer. Criteria could be developed and used to determine if a higher and better use in the waste management hierarchy, such as composting or recycling, is no longer viable for a material.

4. *Monitor the volume of wood waste diverted from landfills to energy recovery.*

Currently the County regularly receives 'incoming' wood waste information from the transfer stations and from several wood waste facilities. As part of its waste characterization program, Clark County estimates the quantity of wood disposed through the transfer station facilities in the Clark County area from construction, remodel and demolition projects. Data-gathering efforts would include 'outgoing' tonnage diverted to energy recovery. This information could be provided to wood processors and appropriate manufacturers in the Pacific Northwest to stimulate new industry and product development.

5. *Review the state priorities for the management of solid waste (70.95.010) and consider establishing energy recovery as a higher priority than incineration and landfilling within Clark County.*

The State's solid waste management hierarchy ranks energy recovery, incineration or landfilling as equal solutions. While using materials for fuel is not

recycling, energy recovery converts solid waste materials into usable energy. Examining the role of energy recovery and its relationship to Clark County's solid waste management system could indicate that the makeup of the hierarchy and recovery rate in Clark County should be changed. An equitable method for measuring and accounting for energy recovery in the County would need to be developed.

Recommendations

The Solid Waste Advisory Commission reviewed the complete list of Alternatives and has recommended the following Alternatives:

2. *Consider alternatives to keep wood waste out of landfills during downturns in hog-fuel markets.*

3. *Develop criteria for diverting paper and plastics to alternative markets during market downturns.*

4. *Monitor the volume of wood waste diverted from landfills to energy recovery.*

5. *Review the state priorities for the management of solid waste (70.95.010) and consider establishing energy recovery as a higher priority than incineration and landfilling within Clark County.*